CLAIMS

1. A device for cleaning an inner pipe which comprises:

a nozzle head comprised of a feed borehole axially disposed therein, at least two rotation nozzles communicating with the feed borehole and extending perpendicularly from the longitudinal axis of the feed borehole, at least two cleaning nozzles communicating with the feed borehole and extending downwardly at an angle from the longitudinal axis of the feed borehole, and a shaft; a rinsing nozzle communicating with the feed borehole and extending upwardly at an angle from the longitudinal axis of the feed borehole; and

an outer sleeve adapted to receive a hollow rod, the shaft being received in the outer sleeve whereby when the device is inserted into an inner pipe and a medium is flowed through the feed borehole and out of the rotation nozzles a force is generated as the medium emerging from the rotation nozzles contacts the wall of the inner pipe which force causes the nozzle head to rotate, the outer sleeve comprising a first means for preventing the nozzle head from descending into the inner pipe disjoined from the outer sleeve when the nozzle head has a first break, the cross-section of which lies above the first means for preventing and a second means for preventing the nozzle head from descending into the inner pipe disjoined from the outer sleeve when the nozzle head has a second break, the cross-section of which lies above the second means for preventing.

2. The device of claim 1 which further comprises a first and second radial bearing and a first and second axial bearing, the bearings being disposed between the shaft and the outer sleeve.

3. The device of claim 2 wherein the radial bearings are cylindrical.

4. The device of claim 3 wherein the first means for preventing comprises an intermediate

sleeve interposed between the outer sleeve and the shaft and positioned above the first radial and axial bearings, the intermediate sleeve having a shoulder that prevents the nozzle head from descending into the pipe disjoined from the outer sleeve when the nozzle head has the first break.

5. The device of claim 4 wherein the shaft further comprises an annular groove and the second means for preventing comprises a protuberance that is secured to the outer sleeve and projects into the annular groove, the protuberance being positioned below the second radial and axial bearings, the protuberance preventing the nozzle head from descending into the pipe disjoined from the outer sleeve when the nozzle head has the second break.

6. The device of claim 1 wherein the nozzle head further comprises:

at least one water outlet in communication with the feed borehole and positioned upwardly from the longitudinal axis of the feed borehole; and

a gap formed in between the water outlet and the outer sleeve, the gap being filled with medium when the medium is flowed through the feed borehole and emerges out of the water outlet.

7. The device of claim 1 which further comprises a vortex brake disposed between the shaft and the outer sleeve.

8. The device of claim 7 wherein the vortex brake comprises:

an inner ring enveloping and joined to at least a portion of the shaft;

a first outer ring enveloping at least a portion of the inner ring; and

a magnet enveloping at least a portion of the inner ring, the magnet and the first outer ring forming a stator, the rotation of the inner ring within the stator being controlled by the

magnetic force being applied to the inner ring from the magnet.

9. The device of claim 8 wherein the vortex brake further comprises a gap formed between the stator and the inner ring, the gap being adapted to receive the medium.

10. The device of claim 9 wherein the magnet comprises at least two magnets encapsulated in a second outer ring.

11. The device of claim 10 wherein the stator comprises a plurality of outer rings that envelop at least a portion of the inner ring, the number of outer rings determining the region that the inner ring is enveloped by the second outer ring.

12. The device of claim 1 wherein the shaft comprises a first part and a second part, the first part being received in the second part and being constructed and arranged to allow axial movement of the second part within the first part and to prevent rotational movement of the second part within the first part.

13. The device of claim 12 wherein the shaft further comprises a damping chamber in communication with a chamber, the damping chamber communicating with the chamber through a damping gap.

14. The device of claim 2 wherein the bearings are comprised of stainless steel, the bearings being adapted to be cooled by a medium when the medium is provided between the nozzle head and the outer sleeve.

15. The device of claim 1 wherein the nozzle head further comprises:

an aperture;

a recess having a top end;

a plunger comprised of a base and a tip and disposed within the recess; and

means for biasing the plunger in a first position wherein the tip extends through the aperture and outwardly from the nozzle head.

16. The device of claim 15 wherein the nozzle head further comprises a spring having a first end and a second end, the first end contacting the base and the second end contacting the top end whereby when a force is applied to the tip and the plunger is in the first position, the spring compresses allowing the plunger to move upwardly within the recess to a second position.

17. The device of claim 16 wherein the plunger is concentrically disposed within the nozzle head.

18. The device of claim 16 wherein the nozzle head further comprises at least two jet nozzles positioned within the nozzle head, the jet nozzles being in communication with the feed borehole when the plunger is in the second position thereby allowing the emergence of medium out of the jet nozzles when the medium is flowed through the borehole and being out of communication with the feed borehole when the plunger is in the first position thereby preventing the emergence of medium out of the jet nozzles when the medium is flowed through the borehole.

19. The device of claim 18 wherein the plunger further comprises a plurality of channel boreholes so constructed and arranged to allow the flow of medium through the channel boreholes to the rotation nozzles or optionally the cleaning nozzles or optionally the rotation

nozzles and the cleaning nozzles when the medium is flowed through the feed borehole and the plunger is in the first position.

20. The device of claim 19 wherein the channel boreholes are constructed and arranged to prevent the flow of medium through the channel boreholes to the rotation nozzles or optionally the cleaning nozzles or optionally the rotation nozzles and the cleaning nozzles when the medium is flowed through the feed borehole and the plunger is in the second position.

21. The device of claim 1 wherein the nozzle head further comprises:

a distal end;

and a central nozzle having an aperture, the central nozzle being in communication with the feed borehole and positioned in the front end whereby when medium is flowed through the feed borehole and emerges out the aperture, the size of the aperture can be adjusted to regulate the flow of the medium therethrough.